SELF-REGULATION, LANGUAGE, AND EXTERNALIZING BEHAVIOR PROBLEMS IN A SAMPLE OF AT-RISK YOUTH: A SOCIAL NEUROSCIENCE APPROACH

A Dissertation

by

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ABSTRACT

Behaviors, both positive and negative, are part of a child's daily social functioning in school, home, and the community. Negative behaviors can impact a child's social functioning and may lead to referral to a mental health professional. The present study uses the SOCIAL Model to explore the relationship between executive functioning, Broad Reading ability, and teacher-rated externalizing behavior problems and its impact on later social functioning in youth. The data showed teacher-reported conduct problems at were predictive of later discipline infractions and social problems of the student. Teacher-reported peer problems at were not predictive of social problems or discipline infractions. Executive functioning at did not mediate or moderate the relationship between Broad Reading ability at and teacher-reported conduct or peer problems. The results of the current study yield implications for social-emotional screening programs throughout the early elementary school years. Screening during this time period would allow for interventions to occur that may lead to a decline in behavioral difficulties in the classroom, both in elementary school and in high school.

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INTRODUCTION

Adolescents can display both positive and negative behaviors that impact their daily functioning. Negative behaviors include defiance, arguing, fighting, stealing, and aggressive behaviors towards people and/or property. These negative behaviors can cause significant disruption to others in multiple settings (e.g., classroom, home, or community) and are among the most common reasons for referral to mental health professionals (Costello & Angold, 2001; Tolan & Leventhal, 2013). These negative behaviors may also prompt a referral and involvement in the juvenile justice system or the adult prison system. In the school setting, these behaviors can lead to suspension, placement in a Disciplinary Alternative Education Setting (DAEP), or expulsion (Archer, 2009).

The school-to-prison pipeline is the collection of educational and public safety policies and practices that impact youth by pushing them out of the classroom environment and into the streets, juvenile justice system, and/or the adult criminal justice system (Archer, 2009). Schools can directly put students into this pipeline through excessive police involvement, imposing zero-tolerance policies, and other disciplinary practices for disruptive behavior. This is particularly true when the actions involve the arrest of the student or send the student to the juvenile justice system. Even without arrest or direct involvement with the juvenile justice system, youth who are removed from the classroom (i.e., suspended or moved to DAEP), even for a short period of time,

are more likely to become involved with the criminal justice system, drugs, alcohol, or drop out of school (Archer, 2009; Gonsoulin, Zablocki, & Leone, 2012). Indirectly and unintentionally, schools put children on a path that leads to incarceration through suspension, expulsion, push-outs, and the removal from the mainstream classroom environment into DAEPs (Gonsoulin et al., 2012; Wald & Losen, 2003).

Juvenile Offenders

Adolescents' delinquent behaviors fall into four categories in the juvenile justice system: crimes against persons or property, drug offenses or public order offenses (Puzzanchera & Robson, 2014). The majority of youth offenses are those against persons (e.g., bodily harm, threat of bodily harm, assault, battery, domestic violence). In 2011, fifty percent of all adjudicated youth were 16 years of age or younger; the majority of the offenders were White and male (78%; Hockenberry & Puzzanchera, 2014). Thirty-two percent of all juveniles arrested in 2011 were African Americans; they made up 36% of the cases handled by juvenile courts (Puzzanchera, 2013). Generally, the likelihood for being adjudicated was greater for more serious offenses (Hockenberry & Puzzanchera, 2014).

Many juvenile offenders meet diagnostic criteria for at least one mental health condition (National Center for Mental Health and Juvenile Justice, 2007). Approximately 65 to 70 percent of the youth in the juvenile justice system meet diagnostic criteria for at least one mental health condition (Cocozza & Skowyra, 2000). The behaviors exhibited by adjudicated youth are closely aligned with Oppositional Defiant Disorder or Conduct Disorder, as well as other disorders (Cocozza & Skowyra,

2000; Colins, Vermeiren, Vreugdenhil, & Brink, Vandenbrink, Doreleijers, & Broekaert, 2010; Fazel, Doll, & Långström, 2008; Kazdin, 2005). Deficits in aspects of social cognition may underlie the negative behaviors that place children at-risk for involvement with the legal system. Identification of these deficits and appropriate prevention and intervention programming could then decrease levels of disruptive behaviors, disciplinary placements, and adjudication rates. A social neuroscience perspective may provide a better understanding of children and adolescents who exhibit disruptive behavior and conduct problems.

The SOCIAL Model

Within the social neuroscience perspective, a key element within the theory, the social brain, is consistent with a multidisciplinary framework. The social brain allows humans to predict the ways others will act based upon their desires and beliefs (C. Frith & U. Frith, 2010). The mirror neuron system is active when individuals do or experience something ourselves, and also when observations are made by someone engaging in a similar experience or activity (C. Frith, 2008). Based on research in developmental psychology, by the age of four children are able to take another individual's perspective (Flavell, 1981; Flavell, Everett, & Croft, 1981; Frick, Mohring, & Newcombe, 2014; Mohring, Newcombe Frick, 2014; Wimmer & Perner, 1983). . This suggests that the social brain is developing from a very young age. The developmental trajectory suggests that deviations from normal trajectory (i.e., disruptive behavior and conduct problems) could be identified in childhood with the potential for prevention/intervention programs.

The SOCIAL Model was developed in order to promote the understanding of social dysfunction through the incorporation of both the biological foundations and social cognitive skills that are required for social communication. The model takes into account internal and external factors of the individual that may impact their social functioning and social skills development. The SOCIAL Model also assumes that development of intact social skills is dependent upon the typical maturation of the brain, cognition, and behavior within that supportive environmental context (Beauchamp & Anderson, 2010).

Several factors comprise the SOCIAL Model. First, the SOCIAL Model is comprised of two initial factors: internal/external factors and brain integrity and development. The Model includes three cognitive functions: attention-executive functioning, communication, and social-emotional development (Beauchamp & Anderson, 2010). Taken together, the environmental context, brain development, and the cognitive functions predict an individual's social competence including their level of social skills functioning. The SOCIAL Model has been applied with specific populations (e.g., traumatic brain injury, autism, and schizophrenia) to better understand these disorders.

The SOCIAL Model and Disruptive Behavior/Conduct Problems

As noted, disruptive behavior, conduct problems, or behavioral dysregulation in relation to TBI has been explained with the SOCIAL Model. This suggests a potential fit and integration of the concept of the social brain and SOCIAL Model to better understand disruptive behavior and conduct problems that may result in juvenile justice

involvement. Based on existing research, there are parallel findings in relation to the Model components for those with disruptive, impulsive, and conduct disorders, or DICD, and juvenile offenders. Across any disorder social cognition may affect the individual's thoughts, language, and social-emotional functioning.

Social Cognition

Social cognition is an attempt to "to understand and explain how the thoughts, feelings, and behavior of individuals are influenced by the actual, imagined, or implied presence of others" (Allport, 1985, p. p. 3). To examine social cognition, the individual is studied within the context of his or her environment. The focus is on how information from others is perceived and how the individual generates information for themselves. Alternatively, Scourfield et al. (1999) referred to social cognition as the "aspects of higher cognitive functioning which underlie smooth social interactions by understanding and processing interpersonal cues and planning appropriate responses" (p.559). However defined, social cognitive abilities are those skills involved with attending to, interpreting, and responding to social cues in one's environment in an appropriate manner. Inability to appropriately process social deficits, such as a hostile attribution bias, could lead to later difficulties in the social information processing cycle (Lansford et al., 2006).

Individual Characteristics

Additional factors are considered when using with SOCIAL Model. These include internal/external factors of social-economic status (SES) and family environment (Beauchamp & Anderson, 2010). SES impacts the development of all children. The

quality of social interactions, opportunities, and frequency can all be associated with SES. Inner-city families may have fewer opportunities to visit safe outdoor playground areas for their children because of area deprivation (Macintyre, Macdonald, & Ellaway, 2008). Koblinksy and colleagues (2006) examined social skills in low-income African American preschool students. It was found that families who engaged in positive parenting practices and a greater amount of family routines had children with greater prosocial skills (Koblinsky et al., 2006). Furthermore, lower family conflict was linked to fewer externalizing problems (Koblinsky et al., 2006).

Verbal Ability and Social Problems

In order to have successful peer relationships, youth must be able to identify and understand emotions, be aware of others' perspectives in terms of thoughts and beliefs, and find resolutions to conflict (Sharp, Fonagy, & Goodyear, 2008). Social communication difficulties may be associated with hyperactivity, conduct problems, or antisocial behavior (Donno, Parker, Gilmour, Skuse, 2010; Ketelaars, Cuperus, Jansonius, & Verhoeven, 2010; Skuse, Mandy, Steer, et al., 2009). Social-emotional problems and social skills deficits can emerge or intensify in adolescents if language difficulties are present. These problems are further exacerbated by the associated academic difficulties and struggles to be successful in the school setting.

Oliver, Barker, Mandy, Skuse, and Maughan (2011) studied the association between conduct problems and social-cognitive competencies. Results indicated the students with conduct problems presented with higher social-cognitive deficits than

students who did not have conduct problems. Those students with early-onset problems were especially deficient in social-cognitive processing (Oliver et al., 2011).

Petersen and colleagues (2013) proposed that language abilities have an independent effect on problem behaviors for two longitudinal samples. Results indicated that language development predicted later problem behavior better than early problem behaviors (Petersen et al., 2013). This is consistent with previous research (Rodriguez et al., 1989), which suggested that poor language ability is associated with attention difficulties and poor behavioral regulation.

In contrast, language impairment is not always associated with higher risk of behavioral difficulties, psychosocial difficulties, or psychiatric disorders (Manninen et al., 2013; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006). For example, Snowling et al. (2006) assessed the psychosocial adjustment of adolescents aged 15-16 years old with a history of speech-language impairment and examined the relation between language deficits and psychiatric disorders. They found no significant association between speech-language impairment during preschool years and late adolescent psychiatric disorders. It was more likely for those students with speech language impairment at the age of 5, however, to have attention difficulties and social impairments if they performed lower on the nonverbal IQ measure (Snowling et al., 2006). Similarly, Karasinski's (2013) found that inhibition, internalizing, and externalizing behaviors were not significantly associated with language abilities in her sample of children ages 8-11 years old. Results were only significant for an association between language ability and attention problems.

These differences in findings may be explained by the measures and aspects of language considered. In particular, deficits in pragmatic language interfere with the ability for the adolescent to gather all the information from their environment. Pragmatic language skills are used to help decipher the social cues of language (Oliver et al., 2011). Individuals with pragmatic deficits miss social cues that may be important to the meaning of a phrase, such as sarcasm (Burt, Mikolajewski, & Larson, 2009). In a subset of children whose primary presenting concern was behavior problems as opposed to language approximately two-thirds of the children also had pragmatic language impairments (Gilmour et al., 2004). Gilmour and colleagues argued that while pragmatic language is a focus in autism, pragmatic deficits may occur in other psychiatric disorders, especially in males.

Self-Regulation/Executive Function and Social Problems

Self-regulation, like executive function, is a broad construct that includes regulation of attentional, emotional, and behavioral responses, as well as cognitive and physiological function (Petersen, Bates, & Staples, 2015). Language deficits are believed to impact the development of self-regulation and other aspects of executive function (Peterson et al., 2015; Rodriguez, Michel, Shoda, 1989; Vallotton & Ayoub, 2011;). Delinquency has been linked to several neuropsychological deficits including poor planning, inhibitions, inappropriate responses, and poor attention and concentration (Moffitt, 1990). Links with poor working memory within the criminal population were significant through many studies (Mogan & Lilienfeld, 2000; Ogilvie, Stewart, Chan, & Shum, 2011).

It also has been argued that self-regulation ability may mediate the effects of language development on later disruptive behavior (Petersen et al., 2015). This is supported by research with children with language impairments and findings of deficits in self-regulation/executive function (Dibbets et al., 2006; Henry et al., 2012; Im-Bolter et al., 2006; Karasinski, 2013; Roben, Cole, Armstrong, 2013; Wolfe & Bell, 2004). Self-regulation, in turn, is related to disruptive behavior. Researchers have found 30-50% of youth with self-regulation difficulties to exhibit disruptive behavior (Anderson et al., 1987; Biederman et al., 1991; Cohen et al., 1993; Zalot, Jones, Forehand, & Brody, 2007). As such, self-regulation difficulties are risk factors for conduct problems in youth (Lober, Kennan, Zhang, 1997, Silverthorn, Frick, Reynolds, 2001; Waschbusch, 2002; Zalot, et al., 2007).

White, Jarrett and Ollendick (2012) investigated the relationship between self-regulation deficits and reactive aggression and proactive in children with internalizing and externalizing behavior problems. They concluded that reactive aggression was associated with both types of behavior patterns, internalizing and externalizing, whereas proactive aggression was typically only seen with externalizing behavior children. Additionally, poor self-regulation was associated with only reactive aggression, which was a common mechanism for children displaying reactive aggression in both internalizing and externalizing children (White et al., 2012).

Ego control and ego resiliency have important implications for cognitive and social-emotional development in youth (Block & Block, 1980; Causadias, Salvatore, & Sroufe, 2012). Both ego control and ego resiliency are needed to develop an

understanding of self-regulation, global adjustment, and the emergence of behavior problems (Letzring, Block, & Funder, 2005). Ego control involves the capacity to regulate and express one's emotions or feelings while ego resiliency involves adapting and responding to situational demands . Individuals with low ego control, or ego undercontrolled, have difficulties regulating and expressing their emotions.

Causadias et al. (2012) found that ego control and ego resiliency were two distinct constructs in a sample of preschool school students. Furthermore, data suggested that these constructs were relatively stable over the elementary school time period for both teacher and observer reports. Elementary school ego resiliency was associated with greater adaptive functioning at the years 19 and 26 years of age for the sample. Ego resiliency also predicted differences in externalizing problems in adulthood. Externalizing behavior items included arguing, breaking rules, stealing, talking, bullying, and harassment. Findings suggested early patterns of self-regulation are important precursors to later adulthood behaviors (Causadias et al., 2012).

Taken together, language abilities and self-regulation impact an individual's social behaviors. Specifically, delayed language can affect both self-regulation and disruptive behavior early on and over time. The overlap in neurological substrates to language and self-regulation provide one way to consider the association, but there are also other theoretical models, at least one of which focuses more on the social behavior and considers extra-individual factors as well as intra-individual factors.

Environmental/External Factors

The social experience for children is largely constrained by the social environment of their family system. Children from poverty can exhibit social difficulties when they reach elementary school due to an increased risk of problem behaviors that can lead to poor peer relationships (Ackerman & Brown, 2006; Beauchamp & Anderson, 2010; Bulotsky-Shearer et al., 2008). Socioeconomic status (SES) also contributes to long-term social outcomes (Anderson et al., 2004) and brain dysfunction (Yeates et al., 2004) resulting in what is known as the "double hazard" (Breslau, 1990). The "double hazard" effect occurs when a combination of social disadvantage occurs in conjunction with a severe brain injury. This combination is detrimental to recovery following an early brain injury (Anderson et al., 2006; Beauchamp & Anderson, 2010; Breslau, 1990).

Brain Development

Neuropsychological impairments contribute to the aggressive, delinquent, and violent behaviors individuals with ODD, CD, and other externalizing behavior problems. The literature examining the relation between neuropsychological impairments and adolescences is not as extensive as for adults. Some researchers have identified different neuropsychological markers to explain conduct disorder, aggression, and violence in adolescents. For example, Moffitt (1993) identified a developmental taxonomy for offending patterns of juvenile delinquency, both life-course persistent and adolescent-limited. These patterns were tested by Raine and colleagues (2005) for differences in neuropsychological impairments. Their research centered on spatial impairments, memory deficits, and the difference between the life-course persistent and adolescent-

limited offenders. Life-course theory argues that early neurocognitive and psychosocial impairments in part cause persistent antisocial behavior but not adolescent-limited behaviors (Moffitt, 1993; Moffitt, Caspi, Rutter, & Silva, 2001).

Research has been conducted examining event-related potential (ERP) at the P300 wave. Adolescents with conduct problems were more likely to have decreased P300 amplitude than those without while listening to auditory stimuli (Bauer & Hesselbrock, 2003). Additionally, functional magnetic resonance imaging studies have found reduced amygdala volume in youth with conduct disorder (Ermer, Cope, Nyalakanti, Calhoun, & Kiehl, 2013; Fairchild et al., 2011; Fairchild et al., 2013; Huebner et al., 2008; Sterzer, Stadler, Poustka, & Kleinschmidt, 2007).

Current Study

The SOCIAL Model has been applied to individuals with schizophrenia, TBI, and ASD to explain the associated behaviors from a multi-disciplinary perspective. For each of these disorders, social impairments are viewed as key to long-term outcome and determined by the components of the model. With the SOCIAL Model, it is proposed that these cognitive processes are interrelated at both the behavioral and neural levels, forming a functional social system (Beauchamp & Anderson, 2010). Some of the same components of the social system - social cognition, empathy, and social interaction - also emerge as critical with regard to disruptive behavior problems that may result in disciplinary action, separation from the school system, and involvement in the juvenile justice system. As yet, the components of the SOCIAL model have not been considered as a means of better understanding social cognitive deficits that may be predictive of

disruptive behavior and subsequent involvement in the legal system. As evident from the literature review, the SOCIAL model may be useful in better understanding, and therefore, prevention and intervention for disruptive behaviors as well.

While other disorders have been considered from the theoretical perspective of the model, no concurrent or longitudinal empirical study has examined the relation and interaction of the SOCIAL Model factors. Consideration of these factors and the trajectory over time is important in order to test the theoretical model, as well as for development and implementation of prevention and intervention programs. The purpose of this study is to examine specific components of the SOCIAL model - language, self-regulation, and behavior problems in relation to later behavior problems and social relationships - in a sample of at-risk youth as a first step.

Research Questions

1. In a sample of at-risk children, to what extent are teacher reported conduct problems and peer relationship problems, as measured by the Strengths and Difference Questionnaire (SDQ; Goodman, 1997) associated with broad reading abilities (as measured by the Woodcock-Johnson Test of Achievement, Third Edition) and executive functioning at Year 1? Do these differ for males/females? By racial/ethnic group? It is hypothesized that lower scores on self-regulation and broad reading tasks will correspond with an increase in conduct problems and peer problems.
2. Does executive functioning measured at Year 1 mediate the association between Year 1 reading ability and Year 4 Conduct Problems, as measured by the teacher SDQ? It is hypothesized that Year 1 executive functioning behavior will not mediate

the relationship between Broad Reading Ability at Year 1 and Conduct Problems at Year 4.

3. Does executive functioning measured at Year 1 moderate the association between Year 1 reading ability and Year 4 Conduct Problems, as measured by the teacher-report SDQ? It is hypothesized that Year 1 executive functioning behavior will moderate the relationship between Broad Reading Ability at Year 1 and Peer Problems at Year 4.
4. Does executive functioning measured at Year 1 mediate the association between Year 1 reading ability and Year 4 Conduct Problems, as measured by the teacher-report SDQ? It is hypothesized that Year 1 executive functioning behavior will not mediate the relationship between Broad Reading Ability at Year 1 and Conduct Problems at Year 4.
5. Does executive functioning measured at Year 1 moderate the association between Year 1 reading ability and Year 4 Conduct Problems, as measured by the teacher-report SDQ? It is hypothesized that Year 1 executive functioning behavior will moderate the relationship between Broad Reading Ability at Year 1 and Conduct Problems at Year 4.
6. Are Conduct Problems at Year 4, as measured by the teacher-reported SDQ, predictive of self-reported antisocial behavior, teacher-reported disciplinary actions, and conduct problems at Year 9? It is hypothesized that Conduct Problems at Year 4, as measured by the teacher SDQ, will not be predictive of antisocial involvement,

but will be predictive of teacher-reported disciplinary actions and social problems at Year 9.

7. Are Peer Problems at Year 4, as measured by the teacher SDQ, predictive of self-reported antisocial behavior, teacher-reported disciplinary actions, and peer problems at Year 9? It is hypothesized that Peer Problems at Year 4, as measured by the teacher SDQ, will not be predictive of antisocial involvement, but will be predictive of teacher-reported disciplinary actions and social problems at Year 9.

Implications for Practice

The current study could assist teachers, parents, and other professionals in understanding the impact of social-emotional learning/social problems at critical periods during a child's life. Screening at these critical periods (e.g., first grade or late elementary school) for social-emotional success or difficulties could allow for early intervention/prevention programming. Such programming potentially could address the deficits in social cognition such that at least some of these children do not become involved in or persist in problem behaviors in high school and beyond. Similarly, screening for self-regulation deficits allows for teachers and other professionals to intervene earlier in a child's life to teach these concepts and monitor learning throughout elementary school and into middle school.

CHAPTER II

LITERATURE REVIEW

Adolescents display both positive and negative behaviors; however, it is the negative behaviors that are of concern. Negative behaviors can include defiance, arguing, fighting, stealing, and aggressive behaviors toward people or properties. These negative behaviors can cause significant disruption to others in multiple types of settings (e.g., classroom, community, or in the home) and are among the most common reasons for referral to mental health professionals (Costello & Angold, 2001; Tolan & Leventhal, 2013). Individuals exhibiting these behaviors may receive one of the diagnoses under DICD; APA, 2013). As noted already, these negative behaviors may prompt school suspension, placement in a DAEP, or expulsion (Archer, 2009), or referral and involvement in the juvenile justice system or the prison system.

One major consideration in the referral and involvement with the juvenile justice system is the school-to-prison pipeline. The school-to-prison pipeline refers to the collection of educational and public safety policies and practices that impact youth by pushing them out of the classroom environment and into the streets, juvenile justice system, and/or the adult criminal justice system (Archer, 2009). Schools can directly put students into this pipeline through excessive police involvement, imposing zero-tolerance policies, and other disciplinary practices for disruptive behavior. This is particularly true when the actions involve the arrest of the student or send the student to the juvenile justice system. Even without arrest or direct involvement with the juvenile

justice system, youth who are removed from the classroom (i.e., suspended or moved to DAEP), even for a short period of time, are more likely to become involved with the criminal justice system, drugs, alcohol, or drop out of school (Archer, 2009; Gonsoulin, Zablocki, & Leone, 2012). Indirectly and unintentionally, schools put children on a path that leads to incarceration through suspension, expulsion, push-outs, and the removal from the mainstream classroom environment into DAEPs (Gonsoulin et al., 2012; Wald & Losen, 2003).

Juvenile Offenders

Adolescents are dealt with through the juvenile justice system due to offenses against persons or property, drugs, or public order (Puzzanchera & Robson, 2014). The majority of the offenses are against persons. These offenses include a broad array of criminal behaviors that typically involve bodily harm, threat of bodily harm, or other actions committed against the will of an individual (e.g., assault, battery, domestic violence). In 2011, 32% of all juvenile cases resulted in either adjudication of delinquency or a waiver to criminal court (Hockenberry & Puzzanchera, 2014). In 2011, fifty percent of all adjudicated youth were 16 years of age or younger; 62% of all adjudicated delinquency cases in 2011 were White youth (Hockenberry & Puzzanchera, 2014). Thirty-three percent of all juveniles arrested in 2010 were African Americans (Puzzanchera, 2013). Generally, the likelihood for being adjudicated was greater for more serious offenses (Hockenberry & Puzzanchera, 2014).

Difficulties with academics can cause some students to act out behaviorally. Maguin and Loeber (1996) found that academic problems could foster behavioral

problems, which frequently result in disciplinary actions in schools (e.g., suspensions, DAEP, expulsions). These actions in turn can result in the removal of a student from the classroom and ultimately with higher likelihood of involvement in the juvenile justice system. This is supported not only by the high rates of learning disabilities in juvenile justice settings (Lansing et al., 2014; Quinn, Rutherford, Leone, Osher, & Poirier, 2005; Williams & McGee, 1994; Winters, 1997), but also the higher than expected rates of mental health issues as compared the normal adolescent population. Overall, the National Center for Mental Health and Juvenile Justice reported approximately 65 to 70 percent of youth in the juvenile justice system meet diagnostic criteria for at least one mental health condition. Similarly, Cocozza and Skowyra (2000) suggested that about 20% of youth in juvenile justice facilities meet diagnostic criteria for a serious mental health disorder. The behaviors exhibited by adjudicated youth are closely aligned with the negative behaviors described earlier and, as such, many adjudicated youth are diagnosed with Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD), as well as other disorders (Cocozza & Skowyra, 2000; Colins, Vermeiren, Vreugdenhil, Brink, Vandenbrink, Doreleijers, & Broekaert, 2010; Fazel, Doll, & Långström, 2008; Kazdin, 2005).

Within the ODD and CD description, characteristics include lack of remorse or guilt; callous unemotional traits or lack of empathy; lack of concern about performance; and shallow or deficient affect (APA, 2013). Many of these characteristics are components of social emotional learning or social cognition. The development of social cognition can be affected by different variables. Most importantly, deficits in aspects of

social cognition may underlie the negative behaviors that place children at risk for involvement with the legal system. Identification of these deficits and appropriate prevention and intervention programming could then decrease levels of disruptive behavior, disciplinary placements, and risk for adjudication. A social neuroscience perspective may provide a better understanding of children and adolescents who exhibit disruptive behavior and conduct problems.

The SOCIAL Model

Social neuroscience is a relatively new field within social psychology and neuroscience. This perspective examines how nervous, endocrine, and immune systems are involved in the sociocultural process (Cacioppo & Berntson, 2002; Harmon-Jones & Devin, 2003) and emphasizes the understanding of how the brain can influence social process and vice versa (Harmon-Jones & Devine, 2003). Cacioppo, Berntson, and Decety (2010) described social neuroscience as an "overarching paradigm in which to investigate human behavior and biology, and whether we as species fit within the broader biological context" (pp.675). Within this perspective there is a strong emphasis in neuroscience (i.e., all human behavior is rooted in biology) and a weaker reliance on social psychology (Todorov, Harris, & Fiske, 2006). Thus, the contributions of multiple disciplines are employed to better understand disruptive behavior, impulsivity, and conduct problems.

Within the social neuroscience perspective, a key element in the theory, the social brain, is consistent with a multidisciplinary type of framework. Conceptually, the social brain allows humans to predict the way others will act based upon their desires

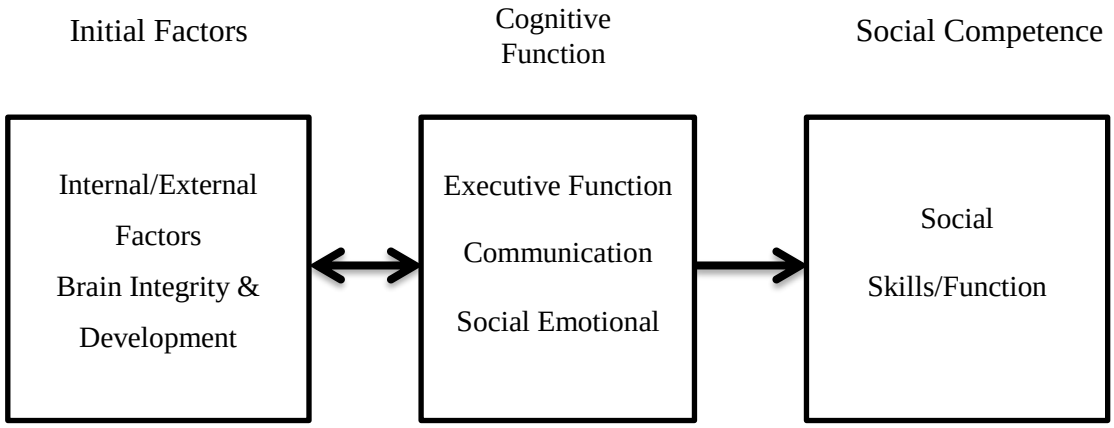
and beliefs (C. Frith & U. Frith, 2010). The social brain also includes the mirror neuron system, which enables individuals to understand others' goals and intentions and empathize with them (C. Frith & U. Frith, 2010). The mirror neuron system is active when individuals do or experience something ourselves, and also when observations are made by someone engaging in a similar experience or activity (C. Frith, 2008). Based on research in developmental psychology, by the age of four children are able to take another individual's perspective (Flavell, 1981; Flavell, Everett, & Croft, 1981; Frick, Mohring, & Newcombe, 2014; Mohring, Newcombe Frick, 2014; Wimmer & Perner, 1983). This suggests that the social brain is developing from a very young age. The developmental trajectory suggests that deviations from normal trajectory (i.e., disruptive behavior and conduct problems) could be identified in childhood with the potential for prevention/intervention programs.

Social problems are often characterized in the context of deviant behavior or delayed social emotional learning (Kupersmidt & Coie, 1990). For example, previous research has shown that children with poor social skills are at a higher risk for exhibiting delinquent or criminal behaviors during adolescence and adulthood (Hawkins, Kosterman, Catalano, Hill, & Abbott, 2005; Kupersmidt & Coie, 1990). Additionally, poor social skills are associated with various neuropsychological and/or psychiatric conditions that are overrepresented in the incarcerated populations (Butler et al., 2006; Leon-Carrion & Ramos, 2003; Slaughter, Fann, & Ehde, 2003). These include, symptoms of psychosis, substance use, personality disorders, (Butler et al., 2006) and a history of TBI (Leon-Carrion & Ramos, 2003; Slaughter, Fann, & Ehde, 2003)

The SOCIAL Model was developed in order to promote the understanding of social dysfunction through incorporation of both the biological foundations and social cognitive skills that are required for social communication (see Figure 1). The model was influenced by Crick and Dodge's Social Information Processing Theory (Beauchamp & Anderson, 2010; Crick & Dodge, 1994) and an integrative multi-level model of social competence for children with a brain disorder (Beauchamp & Anderson, 2010; Yeates et al., 2004). The model also takes into account internal and external factors of the individual that may impact their social functioning and social skills development, such as neighborhood factors and familial or school processes

Figure 1. The SOCIAL Model

(Beauchamp & Anderson, 2010).



From the SOCIAL Model, social skills emerge as a function of typical maturation of the brain, cognition, and behavior, within a supported environmental context. This theoretical model extends previous research by providing an integrated

representation of the cognitive and affective subskills that contribute to social functioning and how these social skills may be altered by internal or external forces. Further, this model assumes that development of intact social skills is dependent upon the typical maturation of the brain, cognition, and behavior within that supportive environmental context (Beauchamp & Anderson, 2010).

The SOCIAL model is comprised of two initial factors: internal/external forces and brain development and integrity. Internal and external forces include personality, temperament, physical attributes, family functioning, socioeconomic status, and culture (Beauchamp & Anderson, 2010). Brain development and integrity reflect developmental trajectories as well as the potential for brain injury. The model also includes three cognitive functions: attention-executive function, communication, and socio-emotional development. Attention-executive function may include the same components as self-regulation and effortful control, including attentional, emotional, and behavioral regulation. Communication includes the individual's language development, a key component for social interaction as well as academic success. Finally, social-emotional development refers to facial or emotional perception, attribution, theory of mind, empathy, and moral reasoning (Beauchamp & Anderson, 2010). Taken together, the environmental context, brain development, and the cognitive functions predict an individual's social competence component including their level of social skills functioning. The SOCIAL Model has been applied within specific populations (traumatic brain injury, autism, and schizophrenia) to better understand these disorders.

SOCIAL Model and Autism Spectrum Disorders

As noted, adolescents who exhibit DICD, often exhibit some autistic-like features, particularly in the area of social cognition. For this reason, examination of the model with Autism Spectrum Disorder (ASD) provides support to consider this model in relation to disruptive behavior disorders. Clinically, ASD are characterized by symptoms of restricted, repetitive patterns of behaviors, interests, or activities and deficits in social communications and interactions across contexts (APA, 2013). The social communication deficits associated with ASD may manifest for individuals differently. For example, some children may withdraw entirely from social interactions, while others may engage in interactions, but may appear awkward or inappropriate. ASD research aligns with the components of the SOCIAL model and the concept of the social brain (Beauchamp & Anderson, 2010). In understanding ASD, Theory of Mind (C. Frith & U. Frith, 2005; Premack & Woodruff, 1978) provides a framework for understanding social deficits and presupposition. Theory of Mind refers to "children's awareness and understanding of the mental states of others, and the effect of others' mental states on their beliefs and behaviors" (Riggs, Jahromi, Razza, Dillworth-Bart, & Mueller, 2006, p. # 301). Theory of Mind tasks require mental flexibility, inhibitory control, working memory, and strategic planning skills (Carlson & Moses, 2001; Frye, Zelazo, & Palfai, 1995; Hughes, 1998; Riggs et al., 2006), all of which are components of self-regulation/executive function.

Furthermore, social manifestations of ASD seem to be consistent with key neural underpinnings and cognitive dimensions of the SOCIAL model (Beauchamp &

Anderson, 2010). A relation between altered neural activity and deficits in social cognition and neural behavior has been observed across studies as well (Beauchamp & Anderson, 2010; Pinkham, Hopfinger, Pelphrey, Piven, & Penn, 2008; Shafritz, Dichter, Baranek, & Belger, 2008; Wang, Lee, Sigman, & Dapretto, 2006). While this model has not been tested empirically with the ASD population, conceptually it seems to make sense.

SOCIAL Model and Traumatic Brain Injury (TBI)

According to a recent meta-analysis, youth in contact with the juvenile justice system are 3.38 times more likely than a typical youth to sustain a TBI (Farrer, Frost, & Hedges, 2013). TBI typically results in damage to one or more of the lobes of the brain (Wilde et al., 2005; Levine et al., 2006). Damage from a TBI can affect the frontal lobes with those effects manifest as cognitive rigidity, impulsivity, attention, self-regulation, personality change, and disorganization (Anderson & Catroppa, 2005; Catroppa & Anderson, 2006; Ciaramelli, Serino, Di Santantonio, & Ladavas, 2006; Ewing-Cobbs, Prasad, Landry, Kramer, & DeLeon, 2004; Nadebaum, Anderson, & Catroppa, 2007). These components comprise the attention/executive function portion of the SOCIAL model (Beauchamp & Anderson, 2010).

In addition, language and communication deficits can be affected, specifically pragmatic language, after sustaining a TBI (Catroppa & Anderson, 2004; Coelho, 2007; Didus, Anderson, & Catroppa, 1999; Morse et al., 1999; Turkstra et al., 2001). Socio-emotional deficits also are affected for individuals suffering from TBI with significant changes in personality in some cases (Li & Liu, 2013; McKinlay, 2010) or impaired

presupposition skills (Beauchamp & Anderson, 2010; Bibby & McDonald, 2005; Dennis, Purvis, Barnes, Wilkinson, & Winner, 2001; Turkstra et al., 2004). Adolescents and children who have sustained severe TBI also may have difficulties with social competence, social participation, and social isolation after sustaining the injury (Beauchamp & Anderson, 2010; Cacioppo, 2002; Mateer & Sira, 2006; McDonald, Flanagan, Rollins, & Kinch, 2003). When the research is considered together, following a severe TBI, a disruption to core components of the SOCIAL model can occur and could account for disruptive behavior and dysregulation (Beauchamp & Anderson, 2010).

The SOCIAL Model and Disruptive Behavior/Conduct Problems

As noted, disruptive behavior, conduct problems, or behavioral dysregulation in relation to TBI has been explained with the SOCIAL Model. This suggests a potential fit and integration of the concept of the social brain and SOCIAL Model to better understand disruptive behavior and conduct problems that may result in juvenile justice involvement. Based on existing research, there are parallel findings in relation to the Model components for those with DICD and juvenile offenders. Across each disorder social cognition may affect the individual's thoughts, language, and social-emotional functioning.

Social Cognition

Social cognition is an attempt to "to understand and explain how the thoughts, feelings, and behavior of individuals are influenced by the actual, imagined, or implied presence of others" (Allport, 1985, p. p. 3). To examine social cognition, the individual

is studied within the context of his or her environment. The focus is on how information from others is perceived and how the individual generates information for themselves. Alternatively, Scourfield et al. (1999) referred to social cognition as the "aspects of higher cognitive functioning which underlie smooth social interactions by understanding and processing interpersonal cues and planning appropriate responses" (p.559). However defined, social cognitive abilities are those skills involved with attending to, interpreting, and responding to social cues in one's environment in an appropriate manner.

Perception, attention, memory, and action planning are all examples of cognitive processes that are involved in social cognition and are important in social interactions (C. Frith, 2008). As humans, sensations are detected from our surrounding environment; the sensations are then turned into perceptions, which activate prior knowledge and current contextual clues about the event (C. Frith, 2008). After the event is perceived, a decision is made on how to act in the current situation; this is followed by the action (e.g., interaction with people, avoiding stimuli, and so on). Processes most concerned with interactions are social stimuli, social decision, and social responses (C. Frith, 2008). Inability to appropriately process social deficits, such as a hostile attribution bias, could lead to later difficulties in the social information processing cycle (Lansford et al., 2006).

Individual Characteristics

Additional factors are considered when using with SOCIAL Model. These include internal/external factors of social-economic status (SES) and family environment

(Beauchamp & Anderson, 2010). SES impacts the development of all children. The quality of social interactions, opportunities, and frequency can all be associated with SES. Inner-city families may have fewer opportunities to visit safe outdoor playground areas for their children because of area deprivation (Macintyre, Macdonald, & Ellaway, 2008). Koblinksy and colleagues (2006) examined social skills in low-income African American preschool students. It was found that families who engaged in positive parenting practices and a greater amount of family routines had children with greater prosocial skills. Furthermore, lower family conflict was linked to fewer externalizing problems (Koblinsky et al., 2006).

Verbal Ability and Social Problems

Individuals must be able to identify and understand emotions, be aware of others' perspectives in terms of thoughts and beliefs, and find resolutions to conflict in order to be successful in peer relationships (Sharp, Fonagy, & Goodyer, 2008). To do so, demands on language can be extensive for the adolescent in maneuvering in social situations as well as academic demands. In fact, social communication difficulties may be associated with hyperactivity, conduct problems, or antisocial behavior (Donno, Parker, Gilmour, Skuse, 2010; Ketelaars, Cuperus, Jansonius, & Verhoeven, 2010; Skuse, Mandy, Steer, et al., 2009). Adolescents with a specific language impairment view themselves as lower in social acceptance than their typically developing peers (Fujiki, Brinton, Hart, & Fitzgerald, 1999; Fujiki, Brinton, Morgan, & Hart, 1999), and also are perceived by teachers as more socially awkward and withdrawn (Hart, Fujiki, Brinton, & Hart, 2004). Social-emotional problems and social skills deficits can emerge

or intensify in adolescents if language difficulties are present. These problems are exacerbated by the associated academic difficulties and struggles to be successful in the school setting.

Oliver, Barker, Mandy, Skuse, and Maughan (2011) studied the association between conduct problems and social-cognitive competencies with approximately 14,000 children in the United Kingdom. The longitudinal study included measures of conduct problems over various time points in the child's life, as well as socio-emotional competence. Socio-emotional competence was a combination of a pragmatic communication checklist and a social communication disorder checklist, both of which the mother completed. Formal language was assessed at age 8 using a standardized measure of verbal ability. Results indicated the students identified with conduct problems presented with higher social-cognitive deficits than students who did not have conduct problems. Those students with early-onset problems were especially deficient in social-cognitive processing. Further, the two measures of social-cognition were independently linked to the conduct problems variable (Oliver et al., 2011).

Further, Petersen and colleagues (2013) proposed language abilities have an independent effect on problem behaviors for two longitudinal samples. Teachers in each of the two studies reported the externalizing and inattentive-hyperactive behaviors displayed by the participants; the age range for the participants across both studies was 4 to 13 years of age. Results indicated that language development predicted later problem behavior better than early problem behaviors (Petersen et al., 2013). This is consistent with previous research (Rodriguez et al., 1989) suggesting that poor language ability is

associated with attentional difficulties and poor behavioral regulation. Other literature (Benner, Nelson, & Epstein, 2002; Brownlie et al., 2004; Lynam, Moffit, & Stouthamer-Loeber, 1993; Yew & O'Kearney, 2013) also supports the association between verbal abilities and conduct problems.

In addition to attention and self-regulation problems, lower verbal abilities are predictive of later violence in adolescent males with conduct problems. For example, when cognitive performance on the Wechsler measures for Finnish reform school boys was compared to the normal population, deficits were found in the verbal domain (Manninen et al., 2013). Factor analysis conducted by the researchers suggested that the majority of the adolescents in the reform school had neurocognitive difficulties specific to the verbal domain. Those adolescents who performed 1.5 standard deviations below the population mean in verbal abilities evidenced a violent criminal record. In contrast, if an adolescent performed above the population mean he or she did not possess a violent criminal record (Manninen et al., 2013). This is consistent with previous studies on resiliency (Kokko & Pulkkinen, 2000). Thus, language ability appears to underlie more than our verbal communication, but also our behavior.

Problem-solving ability is another domain for which language ability is important. Children with a structural language impairment (inability to comprehend or construct sentences with proper grammar), who were referred for behavioral problems, were more immature when it came to resolving interpersonal conflicts than typically developed children (Cohen et al., 1998). Using the same data, Zadeh and colleagues (2007) found that structural language competency mediated the relationship between the

ability to access and use social cognitive resources. Further, Im-Bolter, Cohen, and Farnia (2013) showed that adolescents who were referred for treatment of a variety of psychiatric services including depression, hyperactivity, oppositional defiant, and conduct disorder displayed greater difficulty identifying potential obstacles in a social problem-solving scenario. Additionally, the adolescents with language impairment could not always identify if the conflict was resolved for both parties involved. In these studies, some of the research regarding behavioral and conduct problems mirrors some aspects of autism (Gilmour, Hill, Place, & Skuse, 2004) with social deficits impairing social functioning. Language skills also are a significant component to functional communication skills, which in turn can impact socialization skills (Kennan & Shaw 1997; Kennan & Shaw, 2003).

In contrast, language impairment is not always associated with higher risk of behavioral difficulties, psychosocial difficulties, or psychiatric disorders (Manninen et al., 2013; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006). For example, Snowling et al. (2006) assessed the psychosocial adjustment of adolescents aged 15-16 years old with a history of speech-language impairment and examined the relation between language deficits and psychiatric disorders. They found no significant association between speech-language impairment during preschool years and late adolescent psychiatric disorders. It was more likely for those students with speech language impairment at the age of 5, however, to have attention difficulties and social impairments if they performed lower on the nonverbal IQ measure (Snowling et al., 2006). Similarly, Karasinski's (2013) found that inhibition, internalizing, and

externalizing behaviors were not significantly associated with language abilities in her sample of children ages 8-11 years old. Results were only significant for an association between language ability and attention problems.

These differences in findings may be explained by the measures and aspects of language considered. In particular, deficits in pragmatic language interfere with the ability for the adolescent to gather all the information from their environment. Pragmatic language skills are used to help decipher the social cues of language (Oliver et al., 2011). Individuals with pragmatic deficits miss social cues that may be important to the meaning of a phrase, such as sarcasm (Burt, Mikolajewski, & Larson, 2009). In a subset of children whose primary presenting concern was behavior problems as opposed to language approximately two-thirds of the children also had pragmatic language impairments (Gilmour et al., 2004). Gilmour and colleagues argued that while pragmatic language is a focus in autism, pragmatic deficits may occur in other psychiatric disorders, especially in males.

Self-Regulation/Executive Function and Social Problems

Self-regulation, like executive function, is a broad construct that includes regulation of attentional, emotional, and behavioral responses, as well as cognitive and physiological function (Petersen, Bates, & Staples, 2015). Language deficits are believed to impact the development of self-regulation and other aspects of executive function (Peterson et al., 2015; Rodriguez, Michel, & Shoda, 1989; Vallotton & Ayoub, 2011). Delinquency has been linked to several neuropsychological deficits including poor planning, inhibitions, inappropriate responses, and poor attention and concentration

(Moffitt, 1990). Links with poor working memory within the criminal population were significant through many studies (Mogan & Lilienfeld, 2000; Ogilvie, Stewart, Chan, & Shum, 2011). It also has been argued that self-regulation ability may mediate the effects of language development on later disruptive behavior (Petersen et al., 2015). This is supported by research with children with language impairments and findings of deficits in self-regulation/executive function (Dibbets et al., 2006; Henry et al., 2012; Im-Bolter et al., 2006; Karasinski, 2013; Roben, Cole, Armstrong, 2013; Wolfe & Bell, 2004).

Self-regulation, in turn, is related to disruptive behavior. Researchers have found 30-50% of youth with self-regulation difficulties to exhibit disruptive behavior (Anderson et al., 1987; Biederman et al., 1991; Cohen et al., 1993; Zalot, Jones, Forehand, & Brody, 2007). As such, self-regulation difficulties are risk factors for conduct problems in youth (Lober, Kennan, & Zhang, 1997; Silverthorn, Frick, & Reynolds, 2001; Waschbusch, 2002; Zalot, et al., 2007). The disruptive behaviors can be characterized as hyperactivity, impulsivity, and inattention to tasks (Moffitt, 1993, Waschbusch, 2002; Zalot, Jones, Forehand, & Brody, 2007) as well as noncompliance and conduct problems (Emonds, Ormel, Veenstra, & Oldehinkel, 2007; Speltz, DeKlyen, Calderon, Greenberg, & Fisher, 1999; Kazdin, 2005). Problems with self-regulation can manifest themselves in children and adolescents with low frustration tolerance, failure to plan ahead or consider the consequences for ones actions, talking out of turn or interrupting others, and difficulty sustaining attention for long periods of time during tasks (Zalot, et al., 2007). Additionally, self-regulation difficulties can be related to lower academic and social competence, as well as increased risk for school drop-out

(Farrington, Loeber, van Kammen, 1990; Silverthorn, Frick, & Reynolds, 2001; Waschbusch, 2002; Zalot et al., 2007).

White, Jarrett, and Ollendick (2013) investigated the relationship between self-regulation deficits and reactive aggression and proactive in children with internalizing and externalizing behavior problems. Using the Behavior Rating Inventory of Executive Functioning (BRIEF; Gioia et al., 2000) the researchers looked for common mechanisms between self-regulation deficits associated with reactive aggression and proactive aggression. They concluded that reactive aggression was associated with both types of behavior patterns, internalizing and externalizing, whereas proactive aggression was typically only seen with externalizing behavior children (White et al., 2012). Additionally, poor self-regulation was associated with only reactive aggression, which was a common mechanism for children displaying reactive aggression in both internalizing and externalizing children (White et al., 2012).

Environmental and individual factors in relation to self-regulation and disruptive behavior have been explored as well. For example, Zalot and colleagues (2007) examined the neighborhood context and gender as moderators of the association between self-regulation and conduct problems for low-income African American single-mother families. A significant three-way interaction was obtained for Self-Regulation by Neighborhood Context by Gender such that females who resided in neighborhoods having fewer resources and who were rated lower on the self-regulation scale were more likely to engage in higher levels of conduct problems than girls who had higher levels of resources in their neighborhoods. For boys, an increased risk of engaging in conduct

problems was seen if they were rated as having poor self-regulation, regardless of neighborhood context. The authors' suggested that the neighborhood factors may have a more direct effect on boys' conduct problems than for girls (Zalot et al., 2007).

Two addition markers of self-regulation have been studied in youth development. Ego control and ego resiliency have important implications for cognitive and social-emotional development in youth (Block & Block, 1980; Causadias, Salvatore, & Sroufe, 2012). Both ego control and ego resiliency are needed to develop an understanding of self-regulation, global adjustment, and the emergence of behavior problems (Letzring, Block, & Funder, 2005). Ego control involves the capacity to regulate and express one's emotions or feelings while ego resiliency involves adapting and responding to situational demands. Individuals with low ego control, or ego undercontrolled, have difficulties regulating and expressing their emotions. Additionally, those who are ego undercontrolled tend to exhibit patterns of delinquent behaviors (White et al., 1994). Other research suggests boys who are low in ego control are socially competent (Vaughn & Martino, 1988; Waters, Garber, Gornall, & Vaughn, 1983). Individuals with low ego resiliency have difficulties with situational flexibility and show and inability adapt to dynamic events in a situation (Causadias et al., 2012).

Causadias et al. (2012) found that ego control and ego resiliency were two distinct constructs in a sample of preschool school students. Furthermore, data suggested that these constructs were relatively stable over the elementary school time period for both teacher and observer reports. Elementary school ego resiliency was associated with greater adaptive functioning at the years 19 and 26 years of age for the

sample. Ego resiliency also predicted differences in externalizing problems in adulthood. Externalizing behavior items included arguing, breaking rules, stealing, talking, bullying, and harassment. Findings suggested early patterns of self-regulation are important precursors to later adulthood behaviors (Causadias et al., 2012).

Taken together, language abilities and self-regulation impact an individual's social behaviors. Specifically, delayed language can affect both self-regulation and disruptive behavior early on and over time. The overlap in neurological substrates to language and self-regulation provide one way to consider the association, but there are also other theoretical models, at least one of which focuses more on the social behavior and considers extra-individual factors as well as intra-individual factors.

Environmental/External Factors

The social experience for children is largely constrained by the social environment of their family system. Children from poverty can exhibit social difficulties when they reach elementary school due to an increased risk of problem behaviors that can lead to poor peer relationships (Ackerman & Brown, 2006; Beauchamp & Anderson, 2010; Bulotsky-Shearer et al., 2008). Socioeconomic status (SES) also contributes to long-term social outcomes (Anderson et al., 2004) and brain dysfunction (Yeates et al., 2004) resulting in what is known as the double hazard effect (Anderson et al., 2006; Breslau, 1990). The double hazard effect occurs when a combination of social disadvantage occurs in conjunction with a severe brain injury. This combination is detrimental to recovery following an early brain injury (Anderson et al., 2006; Beauchamp & Anderson, 2010; Breslau, 1990).

Research has documented the challenges faced by individuals and families living in economically disadvantaged areas (De Coster, Heimer, & Wittrock, 2006; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Rios, 2011; Timberlake, 2009). Rates of incarceration are higher among men who live in these economically disadvantages communities; their confinement also leads to further strain on their communities (Clear, 2007; Fayyad et al., 2007; Pager, 2008). Pager argued that if an individual comes into contact with the criminal justice system, it impacts many aspects of life including familial ties, relationship status, and employment opportunities. In terms of juvenile justice, Hockenberry and Puzzanchera (2014) found that adjudicated cases involving black youth were most likely to be placed in an out-of-home placed than cases involving any other race. Families from disadvantaged backgrounds, mainly minorities, lack the adequate resources to help their child thrive; therefore, the court may believe confinement is the only viable option for the youth (Rodriguez, 2013).

As previously stated, a child's family network largely determines their social environment, at least early on in their development. From infancy, maternal attachment influences the development of social skills (Bowlby, 1962; Root, Hastings, & Maxwell, 2012). Adolescent attachment and social skill levels were assessed in a sample of at-risk adolescents (Allen et al., 2002). Adolescents with security attachment to their mothers had stronger social skills from ages 16 to 18 years of age; whereas, the insecure-preoccupied attachment style predicted an increase in delinquent activity during this period (Allen et al., 2002). Additionally, a moderating effect was found for the insecure-preoccupied attachment style on the relation between familial autonomy and social skills

level (Allen et al., 2002). Maternal autonomy, in this study, was associated with higher levels of delinquency over time with preoccupied individuals (Allen et al., 2002). Maternal autonomy and preoccupation in adolescents is often the case for individuals living in impoverished communities.

Cultural influences also play a fundamental role in social development of a child. These cultural influences permeate through child-rearing practices, educational systems, customs; they dictate what is acceptable social normative behavior (Anderson & Beauchamp, 2012). Broidy et al. (2003) examined the developmental trajectory of disruptive behavior disorder in childhood and how they manifested into adolescent delinquency across three countries, the United States, Canada, and New Zealand, using six different data sets. Chronic physical aggression during elementary years is a risk factor for later delinquent behaviors in adolescence in males. For females, there was no clear linkage between childhood physical aggression and adolescent delinquent behaviors (Broidy et al., 2003).

Brain Development

Neuropsychological impairments contribute to the aggressive, delinquent, and violent behaviors individuals with ODD, CD, and other externalizing behavior problems. The literature examining the relation between neuropsychological impairments and adolescences is not as extensive as for adults. Some researchers have identified different neuropsychological markers to explain conduct disorder, aggression, and violence in adolescents. For example, Moffitt (1993) identified a developmental taxonomy for offending patterns of juvenile delinquency, both life-course persistent and adolescent-

limited. These patterns were tested by Raine and colleagues (2005) for differences in neuropsychological impairments. Their research centered on spatial impairments, memory deficits, and the difference between the life-course persistent and adolescent-limited offenders. Life-course theory argues that early neurocognitive and psychosocial impairments in part cause persistent antisocial behavior but not adolescent-limited behaviors (Moffitt, 1993; Moffitt, Caspi, Rutter, & Silva, 2001).

In the Raine et al. study (2005), measures of neuropsychological functioning included a Continuous Performance Task (Nuechterlein, Parasuraman, Jiang, 1983), Wisconsin Card Sorting Task (Grant & Berg, 1948), Verbal Dichotic Listening (Raine, O'Brien, Smiley, Scerbo, & Chen, 1990), Verbal and Visuospatial Memory (Wechsler, 1945), Vocabulary, Information, Block Design, and Picture Completion (Wechsler, 1991). Findings revealed that community offenders showed spatial and verbal impairments, on memory and non-memory cognitive tasks. Life-course persistent offenders were impaired on both neurocognitive and psychosocial factors. In contrast, childhood-limited offenders exhibited some neurocognitive deficits. Notably, these deficits were independent of abuse, psychosocial adversity, head injury, and attention deficit/hyperactivity disorder (ADHD; Raine et al., 2005).

Neurocognitive impairments develop in a variety of ways (Blair, 2005). One theory of neurodevelopmental impairments related to disruptive behavior and conduct problems posits decreased amygdala responsiveness to distress cues and a decreased activation of the striatal structures and ventromedial prefrontal cortex (Blair, 2013). The decreased activation in the striatum and ventromedial prefrontal cortex can affect the

sensitivity to reinforcement signals that are essential for effective decision-making (Blair, 2013). Youth with psychopathic tendencies (Finger et al., 2012) and CD show reduced ventromedial prefrontal cortex response to the receipt of a reward (Blair, 2013). Another pathway studied extensively in youth with CD is that pathway connecting the amygdala, the hypothalamus and the periaquaductal gray (PAG; Behbehani, 1995). This basic threat path is overly responsive in individuals with CD because of prior priming or poor regulation or both (Blair 2013; Dodge, Lochman, Harnish, Bates, & Pettit, 1997). Further, individuals with CD and low callous-unemotional traits displayed higher levels of threat-based and frustration-based reactive aggression (Dodge, Lochman, Harnish, Bates, & Pettit, 1997).

Imaging studies also have been conducted with individuals with CD to determine if there were differences in brain structure and function. Consistent with implications of amygdala involvement, several functional magnetic resonance imaging, or functional MRI (fMRI), studies have found reduced volume in the amygdala of those with CD (Ermer, Cope, Nyalakanti, Calhoun, & Kiehl, 2013; Fairchild et al., 2011; Fairchild et al., 2013; Huebner et al., 2008; Sterzer, Stadler, Poustka, & Kleinschmidt, 2007;). Similarly, temporal cortex volume (Fairchild et al., 2011; Huebner et al., 2008; Krusei, Casanova, Mannheim, & Johnson-Bilder, 2004) and thickness (Hyatt, Haney-Caron, & Stevens, 2011) also were reduced for individuals with CD. Studies examining the ventromedial prefrontal cortex have been mixed (Blair, 2013). Some studies found that individuals with CD have reductions in ventromedial cortex volume (Ermer, Cope, Nyalakanti, Calhoun, & Kiehl, 2013; Huebner et al., 2008), cortical thickness (Fahim et

al., 2011), or folding (Hyatt, Haney-Caron & Stevens, 2011), but other studies have not replicated these findings (De Brito et al., 2009; Fairchild et al., 2011; Fairchild et al., 2013; Sterzer, Stadler, Poustka, & Kleinschmidt, 2007).

Additional imaging studies have been conducted by examining event-related potential (ERP) at the P300 wave. Adolescents with conduct problems have a decreased P300 amplitude while listening to auditory stimuli (Bauer & Hesselbrock, 2003). Additionally, Bauer and Hesselbrock (2003) found that individuals with conduct problems, rule violations subtype, did not present with the same maturation increase in the frontal P300 area as measured by current source density. Iacono and McGue (2006) examined delinquent behaviors (e.g., tobacco, alcohol, and drug use; engaging in sexual activities) and their association with P300 amplitude in 17 year old twins. Engaging in one of these delinquent behaviors, prior to the age of 15, was associated with a decrease in P300 amplitude and problem behaviors at the age of 17 (Iacono & McGue, 2006). Thus, there is a documented association between brain activation patterns and disruptive behavior.

Current Study

The SOCIAL Model has been applied to individuals with schizophrenia, TBI, and ASD to explain the associated behaviors from a multi-disciplinary perspective. For each of these disorders, social impairments are viewed as key to long-term outcome and determined by the components of the model. With the SOCIAL Model, it is proposed that these cognitive processes are interrelated at both the behavioral and neural levels, forming a functional social system (Beauchamp & Anderson, 2010). Some of the same

components of the social system - social cognition, empathy, and social interaction - also emerge as critical with regard to disruptive behavior problems that may result in disciplinary action, separation from the school system, and involvement in the juvenile justice system. As yet, the components of the SOCIAL model have not been considered as a means of better understanding social cognitive deficits that may be predictive of disruptive behavior and subsequent involvement in the legal system. As evident from the literature review, the SOCIAL model may be useful in better understanding, and therefore, prevention and intervention for disruptive behaviors as well.

While other disorders have been considered from the theoretical perspective of the model, no concurrent or longitudinal empirical study has examined the relation and interaction of the SOCIAL Model factors. Consideration of these factors and the trajectory over time is important in order to test the theoretical model, as well as for development and implementation of prevention and intervention programs. The purpose of this study was to examine specific components of the SOCIAL model - language, self-regulation, and behavior problems in relation to later behavior problems and social relationships - in a sample of at-risk youth as a first step.

CHAPTER III

METHODS

This is a longitudinal research design utilizing an existing data set. Data were gathered in conjunction with larger longitudinal study examining the impact of grade retention on academic achievement from three school districts (one urban, two small cities) in Central and Southeast Texas (Hughes & Kwok, 2006). Only specific data, from specific years will be used in this study. Sample size is sufficient for adequate power for the proposed analyses. This research was supported in part by a grant to Jan N. Hughes from the National Institute of Child Health and Human Development (5 R01 HD39367-02).

Participants

Children were recruited across two sequential cohorts in the first grade during the fall of 2001 and 2002. Children were eligible for participation in the longitudinal study if they performed below the median score on a state-approved measure of literacy administered by their school district in either May of their kindergarten year or September of their first-grade year and had not been previously retained in the first grade. School records indicated that 1,374 children were eligible for participation in the study. Consent forms were sent home with the child's weekly folders; incentives were offered for returning the consent, regardless of consent decision.

During the re-consent process in year 6, a total of 569 participants consented to continue with the study. By Year 9, 528 participants were still active; 14 students withdrew from the study and 27 students were lost from the study. A total of 684 parents

consented for their children to participate in the study during the first consent period. The overall attrition rate was 50.21from Time 1 to Time 9. There were no significant differences between attrition rates and ethnicity; however, more males (86.4%) appeared to drop-out of the study than females (13.6%). The ethnic composition across the two cohorts was 20.5% African American, 33.7% Hispanic, 29.8% Caucasian, and 4% Other. At the beginning of first grade, the participants' mean age was 7.35 years (SD = .52; Hughes & Kwok, 2006). Table 1 depicts data for each cohort included in the current study.

Table 1 Summary of Characteristics at Time 1

	Cohort 1 (N=349)		**Cohort 2** (N=335)	
Variable	n	%	n	%
Gender				
Males	188	41.9%	175	52.2%
Females	161	35.9%	160	47.8%
Race/Ethnicity				
African-American	84	18.7%	77	23%
Caucasian	110	24.5%	125	37.3%
Hispanic	139	31%	124	37%
Other	16	3.6%	9	2.7%
Special Education Services	50	11.1%	2	.6%
Child age at Time 1				
Mean in years (SD)	7.36	(.53)	7.31	(.53)
Bilingual Status				
No	302	67.3%	173	51.6%
Yes	47	10.5%	43	12.8%

Procedures

Once consent was obtained, annual assessments were conducted each year, beginning when the participants were in first grade/Time 1. Teacher questionnaires were administered in the spring of first grade to assess teachers' perceptions of effortful control, as well as prosocial and antisocial behaviors. Teachers received a small monetary gift for completing and returning the questionnaires. Each year research staff administered math and reading achievement individually to each participant, with the caveat that at least 8 months had to separate each annual assessment. Children's self-perceptions of problem behaviors and antisocial behavior involvement were included in a longer questionnaire that was administered in individual sessions conducted at each school.

Measures

A number of measures were used to test the components of the SOCIAL model in relation to problem behaviors. The variables used for each construct are indicated in Table 2.

Table 2 Measurement of Variables Across Time Points

Construct	*Variables*	*Time Points*
Demographics	Gender, Age, Race/Ethnicity	T1, T4, T9
Language Arts	WJ-III/ Batería Broad Reading	T1
Problem Behaviors	Teacher SDQ: Conduct Problems	T1, T4, T9
	Teacher SDQ: Peer Relationships	T1, T4, T9
Executive Function	Walk-a-Line Star	T1
Executive Function	EC/ERQ: Ego Resilience EC/ERQ: Emotional Reactivity	T1
Behavioral Outcome	Antisocial Involvement Scale	T9
	Disciplinary Record	T9

Notes. WJ-III= Woodcock Johnson Test of Achievement, Third Edition; Batería= Woodcock-Muñoz Batería; SDQ= Strengths and Difficulties Questionnaire; EC/ERQ= Effortful Control/Ego Resiliency Questionnaire

Woodcock Johnson – Third Edition Achievement Battery

The Woodcock-Johnson Tests of Achievement (WJ-III ACH; Woodcock et al., 2001) is an individually administered measure of academic achievement for individuals ages two to adulthood. The WJ-III ACH Broad Reading cluster score was used for the purposes of this project and is a composite score comprised of the WJ-III ACH Letter-Word Identification, Reading Fluency, and Passage Comprehension subtest. Extensive research provides evidence of construct validity and reliability for the WJ-III ACH (Woodcock et al., 2001). For children whose dominant language was determined to be Spanish, based on the Woodcock-Muñoz Language Proficiency Test (Woodcock & Muñoz-Sandoval, 1993), the Batería Woodcock-Muñoz: Pruebas de Aprovechamiento-Revisada (Batería-R; Woodcock & Muñoz-Sandoval, 1996) was used instead of the WJ-III ACH. The Woodcock-Muñoz Language Proficiency Test has adequate validity and reliability (Woodcock & Muñoz-Sandoval, 1993). The Batería-R has a comparable Broad Reading cluster to the WJ-III ACH, as well as evidence of construct validity and reliability (Woodcock & Muñoz-Sandoval, 1996). The decision to use the Batería-R or WJ-III ACH was based on the child's language proficiency score on the Woodcock-Muñoz Language Proficiency Test; a higher score on the English portion was achieved, then the child would be given the WJ-III ACH. Both the WJ-III ACH and Batería-R yield W scores, which are based on the Rasch measurement model. These scores yield an equal interval scale and are well-suited for longitudinal data analysis (Luo, Hughes, & Liew, 2009).

Effortful and Inhibitory Control

Effortful control was observed during children's first and second grade years with two different tasks (Walk-a-Line and Star) from a behavioral battery designed to measure inhibitory and effortful control (Kochanska, Murray, & Coy, 1997; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996; Murray & Kochanska, 2002). For the Walk-a-Line task, children were asked to walk along a ribbon measuring 12 feet by 2.5 inches. On the Star task, children were asked to use a pencil to trace geometric figures without going outside the lines of the designated figure (Liew et al., 2008). Children's behaviors were observed and recorded by a trained research assistant who individually administered these assessments in the schools. Scores for the inhibitory control tasks were derived by the duration (in seconds) that it took the child to complete the Walk-a-Line and Star tasks after instructions were read in order to get effortful control scores (Liew et al., 2008). Baseline effortful control scores were gathered by children completing tasks with no instructions to modulate or slow their behaviors (Liew et al., 2008). These tasks have been found to be reliable and valid measures of effortful control and inhibitory control for children ranging from toddlers to early grade school (Murray & Kochanska, 2002). For the current dataset, a single research assistant administered all trials of the inhibitory and effortful control; therefore, no inter-rater reliability data is available.

Social Competence Scale

The Social Competence Scale (Conduct Problems Prevention Research Group, 1999) is a 25-item measure that assesses a child's prosocial, emotional self-regulation,

and academic skills. The Social Competence Scale was created for the FAST Track Project. Each item on the Social Competence Scale is a behavior a student could potentially display in a classroom setting. The current study will only utilize the emotional self-regulation subscale; within the subscale, two factors were calculated, ego resiliency (α = .88) and ego control (α = .35). These factors will be used in conjunction with other measures to examine executive function.

Strengths and Difficulties Questionnaire (SDQ)

Teachers and students completed the Strengths and Differences Questionnaire (SDQ; Goodman, 1997). The SDQ is a brief, 25-item, screening measure for psychopathology. Each item is rated on a 0-2 scale (e.g., not true, somewhat true, and certainly true). The SDQ yields five scales comprised of five questions each: conduct problems, hyperactivity, emotional symptoms, peer problems, and prosocial behaviors (Goodman, 1997). Hyperactivity, emotional symptoms, conduct problems and peer problems are then summed to generate a Total Difficulties Score. Goodman (1997) indicates that the prosocial score is not part of the Total Difficulties Score due to the fact that the absence of prosocial behavior is different from the presence of psychological difficulties. Research has documented that the SDQ produces valid and reliable scores (Dickey & Blumberg, 2004; Goodman, 2001; Hill & Hughes, 2007). Goodman (2001) reported interrater correlations ranging from r = 0.21 to 0.33 for teacher and youth reports. Reliability coefficients for teacher reports ranged from r = 0.74 to 0.87 and r = 0.41 to 0.80 on self-reports (Goodman, 2001). Teachers were typically better reporting conduct problems and hyperactivity, while parents were better at reporting on emotional

problems (Du & Hu, 2008; Goodman, Renfrew, & Mullick, 2000). Self-report SDQs for conduct problems and hyperactivity are less predictive than from the parents and teachers (Goodman, Ford, Simmons, Gatward, & Meltzer, 2000 2000; van der Meer, Dixon, & Rose, 2008). For the purposes of this study, the conduct problems and peer problems factors will be utilized from both the teacher SDQ and the self-report SDQ.

Antisocial Involvement Scale

The Antisocial Involvement Scale is a 4-item scale derived from an 8-item scale used by Mahoney and Stattin (2000). Students were asked during individual interviews whether or not they participated in four antisocial activities (i.e., being caught by the police, taking part in a fight, destroying property, or skipping school). Individuals respond to the question saying "yes" or "no" when the researcher poses the question. For specific items (i.e., taking part in a fight and skipping school) students were asked to tell the researcher how often they take part in the activity ("less than once a month," "once a month," "twice a month," or "daily"). Responses were only coded for the engagement in the activity, regardless of the frequency. An overall antisocial behavior score is yielded, which will be used for the current study.

Disciplinary Status

The teacher, at Year 9 of the study, completed the disciplinary status measure. Teachers were asked if the student had been engaged in any of a number of different disciplinary methods ranging from "office referral" to "expulsion." The teachers were allowed to check multiple boxes per student. For the purposes of this study, this variable will be a dichotomous variable. If a student had any history of discipline infractions,

they will be coded as having discipline problems. If the student was not rated as having discipline infractions by their teacher, they will be coded as not having discipline problems at Year 9.

Research Questions

Research Question 1

In a sample of at-risk children, to what extent are teacher reported conduct problems and peer relationship problems, as measured by the Strengths and Difference Questionnaire (SDQ; Goodman, 1997) associated with broad reading abilities (as measured by the Woodcock-Johnson Test of Achievement, Third Edition) and executive functioning at Year 1? Do these differ for males/females? By racial/ethnic group?

To determine the level of association between conduct problems, peer problems, executive functioning, and broad reading ability a one-tailed correlation analysis will be conducted. A one-tailed test was used because the hypotheses are testing the direction of effect for this question. It was hypothesized that lower scores on executive functioning and broad reading tasks will correspond with an increase in conduct problems and peer problems.

To determine if there are differences for males/females or by racial/ethnic group among the relationship between the multivariate analysis of variance was conducted. It was hypothesized that males will have increased scores on conduct problems and peer problems and this will correspond with decreased scores on the broad reading and self-regulation tasks. It was also hypothesized that minority students will have increased

scores on conduct problems and peer problems and this would correspond with decreased scores on the broad reading and executive functioning task scores.

Research Questions 2 & 3

Does executive functioning measured at Year 1 mediate or moderate the association between Year 1 reading ability and Year 4 Conduct Problems, as measured by the teacher SDQ? It was hypothesized that Year 1 executive functioning behavior would moderate the relationship between Broad Reading Ability at Year 1 and teacher-reported Conduct Problems at Year 4. The independent variable was Y1 broad reading ability, the dependent variable is Y4 conduct problems. The mediator/moderator that is being tested is the average of Y1 executive function scores. To determine if Y1 executive functioning mediated or moderated teacher reported conduct problems, longitudinal structural equational modeling will be conducted.

Research Questions 4 & 5

Do executive functioning variables measured at Year 1 mediate or moderate the association between Year 1 reading ability and Year 4 Peer Problems, as measured by the teacher SDQ? It was hypothesized that Year 1 executive function behavior would moderate the relationship between Broad Reading Ability at Year 1 and self-reported Conduct Problems at Year 4. The independent variable was Y1 broad reading ability, the dependent variable is Y4 conduct problems. The mediator/moderator that was tested was the executive function score at Year 1. To determine if Y1 executive function mediated or moderated teacher-reported conduct problems, longitudinal structural equational modeling will be conducted.

Research Question 6

Are Conduct Problems at Year 4, as measured by the teacher SDQ, predictive of self-reported antisocial behavior, teacher-reported disciplinary actions, and conduct problems at Year 9? It was hypothesized that Conduct Problems at Year 4, as measured by the teacher SDQ, would not be predictive of antisocial involvement, but would be predictive of teacher-reported disciplinary actions and social problems at Year 9. Independent variables include Y4 conduct problems. Dependent variables include Y9 self-reported antisocial behavior, Y9 teacher-reported disciplinary status, and Y9 teacher-reported conduct problems. Multivariate analysis of variance analysis was conducted to determine the relationship among the variables.

Research Question 7

Are Peer Problems at Year 4, as measured by the teacher SDQ, predictive of self-reported antisocial behavior, teacher-reported disciplinary actions, and peer problems at Year 9? It was hypothesized that Peer Problems at Year 4, as measured by the teacher SDQ, would not be predictive of antisocial involvement, but would be predictive of teacher-reported disciplinary actions and peer problems at Year 9. To determine the relationship among Y4 teacher-reported peer problems, Y9 self-reported antisocial behavior, Y9 teacher-reported disciplinary status, and Y9 teacher-reported peer problems multivariate analysis of variance was be conducted. Independent variables include Y4 peer problems. Dependent variables include Y9 self-reported antisocial behavior, Y9 teacher-reported disciplinary status, and Y9 teacher-reported peer problems.

CHAPTER IV

RESULTS

Prior to addressing research questions, the data set was analyzed to ensure that assumptions of normality have been met and to address any missing data. These were met for the majority of measures; however, there was a flat distribution on some of the teacher-reported items. This includes: T1 teacher-reported conduct problem and peer problems, T9 teacher-reported discipline, T9 self-reported antisocial behavior, and T1 Broad Reading scores. This suggests that the sample is homogenous on these variables. Variables in this sample are also dependent on one another. Analysis proceeded despite these results. Table 3 includes mean, standard deviation, skewness and kurtosis statistics for all measures of EF, externalizing behavior, and personal adjustment.

Table 3 Descriptive Statistics: Externalizing Behavior, Reading, and Discipline

				Skewness		Kurtosis	
Variable	N	Mean	Std. Deviation	Statistic	Std. Error	Statistic	Std. Error
T CP T1	684	2.33	3.07	1.57	.09	2.50	.18
T PP T1	684	1.97	2.79	1.54	.09	2.01	.18
EF T1	406	11.20	1.08	.49	.12	.09	.24
Reading T1	684	397.05	123.67	-2.75	.09	6.13	.19
T CP T4	684	4.09	3.40	.42	.09	.02	.18
T PP T4	684	3.90	3.18	.29	.09	-.17	.18
Antisocial	470	.62	.98	1.69	.11	2.31	.23
T CP T9	498	2.99	3.04	.56	.11	-.19	.22
T PP T9	467	2.97	3.15	.50	.11	-.53	.23
Discipline T9	406	.37	.79	2.49	.12	6.35	.24

Note. T CP T1= Teacher-reported conduct-problems T1; T PP T1= Teacher-reported peer problems T1; EF T1= Executive Function score T1; Reading T1=Broad Reading Score T1; T CP T4= Teacher-reported conduct-problems T4; T PP T4= Teacher-reported peer problems T4; Antisocial= self-reported antisocial behaviors T9; T CP T9= Teacher-reported conduct-problems T9; T PP T9= Teacher-reported peer problems T9; Discipline T9= Teacher-reported discipline T9

Question 1: SOCIAL Model

In a sample of at-risk children, to what extent are teacher reported conduct problems and peer relationship problems, as measured by the Strengths and Difference Questionnaire (SDQ; Goodman, 1997) associated with broad reading abilities (as measured by the Woodcock-Johnson Test of Achievement, Third Edition) and executive functioning at Year 1? Do these differ for males/females? By racial/ethnic group? It was hypothesized that executive functioning and broad reading scores would positively correlated with teacher-reported conduct problems and peer problems.

A correlation matrix was created on the teacher SDQ ratings, standardized assessments of executive function and broad reading (See Table 4). As hypothesized broad reading and executive functioning scores were positively correlated with teacher-reported peer problems and teacher-reported conduct problems. For teacher-reported conduct problems were significantly correlated with Broad Reading scores (r= .12, p<.001), as well as for executive functioning (r= .17, p<.001) scores. Regarding teacher-reported peer problems, Broad Reading scores (r= .13, p<.001) and executive functioning scores (r= .29, p<.001) were also significantly correlated.

In order to determine if significant differences were present among different racial/ethnic groups or if differences by gender existed, multivariate analysis of variance (MANOVA) was conducted. The first MANOVA tested the differences between race/ethnicity on Broad Reading scores, executive functioning scores, teacher-reported conduct problems, and teacher-reported peer problems. As shown in Table 5, there were

no significant differences between race/ethnic groups on these scales [F (7, 365)= 1.29, p=.22; Wilks' Λ=.96; partial η^2 = .01]. The second MANOVA compared gender and the aforementioned variables. Like the previous MANOVA, no significant differences between gender were found [F (7,365) = .28, p=.89; Wilks' Λ=.99; partial η^2 = .01].

Table 4 Correlation Matrix

	Teacher-Reported Conduct Problem	Teacher-Reported Peer Problems
Broad Reading	.12*	.13*
Executive Function	.17*	.29*

Note. *p< .01, one-tailed

Table 5 Multivariate Analysis of Variance Summary

Source	df	F	partial η^2	Wilks' Λ	*p*
Ethnicity	12	1.29	.01	.96	.22
Gender	4	.28	.001	.99	.90

Research Questions 2 & 3: Mediation/Moderation Conduct Problems

Do executive functioning variables measured at Year 1 mediate or moderate the association between Year 1 reading ability and Year 4 Conduct Problems, as measured by the teacher SDQ? It was hypothesized that Year 1 executive functioning behavior will moderate the relationship between Broad Reading Ability at Year 1 and teacher-reported Conduct Problems at Year 4.

To test the hypothesis whether Year 1 executive functioning scores moderate the relationship between Year 1 Broad Reading scores and Year 4 teacher-reported conduct problems, a hierarchical multiple regression analysis was conducted. Table 6 shows the regression coefficients for the moderation analysis. In the first step, two variables were included: Year 1 Broad Reading scores and Year 1 executive function scores. These variables did not account for a significant amount of variance in teacher-reported conduct problems (R^2= .001, F (2, 372) = .10, p< .91). Next, the interaction term between Broad Reading and executive functioning was added to the regression model. Like the previous regression model, it did not account for a significant amount of variance in teacher-reported conduct problems in Year 4 (R^2= .001, F (1, 371) = .09, p< .76).

To test the whether Year 1 executive functioning scores mediated the relationship between Year 1 Broad Reading scores and Year 4 teacher-reported conduct problems, regression methods also were used using the Process software in SPSS (Hayes, 2011). Table 7 shows the regression coefficients for the mediation analysis. In Step 1 of the mediation model, the regression of the Year 1 Broad Reading scores on Year 4 teacher-reported conduct problems, ignoring the mediator, was not significant (B = -.001, t (373) = -.43, p = .67). Step 2 showed that the regression of the Broad Reading scores on the mediator, executive function scores, was not significant, (B = .001, t (373) = 1.08, p = .28). Step 3 of the mediation process showed that the mediator (executive function), controlling for Broad Reading scores, was not significant (B = .02, t (372) = .12, p = .90).

Table 6 Moderation Analysis for Teacher-Reported Conduct Problems

	Teacher-Reported Conduct Problems T4			
Variable	*B*	SE_B	t	*p*
Step 1				
Constant	4.50	1.44	3.13	.002
EF	.02	.18	.12	.90
Reading	-.001	.002	.39	.69
Step 2				
Constant	2.58	6.54	.39	.69
EF	.28	.89	.32	.75
Reading	.004	.02	.25	.80
EF*Reading	-.001	.002	-.30	.76

Note. EF=Executive Functioning Year 1; Reading= Broad Reading score Year 1; EF* Reading= Executive Functioning and Broad Reading Interaction;

Table 7 Mediation Regression Analysis for Teacher-Reported Conduct Problems

	Conduct Problems Y4			
Variable	*B*	SE_B	t	*p*
Step 1				
Constant	4.65	.62	6.96	.001
Reading	-.001	.002	-.43	.67
Step 2				
Constant	7.27	.20	36.66	.001
Reading*	.001	.001	1.08	.28
Step 3				
Constant	4.50	1.43	3.13	.001
EF	.021	.17	.12	.90
Reading	-.001	.001	-.43	.66

Note. EF=Executive Functioning; Reading= Broad Reading scores Y1; Reading*= Reading scores with dependent variable being Executive Function

Research Question 4 & 5: Mediation/Moderation for Peer Problems

Do executive functioning variables measured at Year 1 and Year 2 mediate or moderate the association between Year 1 reading ability and Year 4 Peer Problems, as measured by the teacher SDQ? It was hypothesized that Year 1 executive functioning behavior will moderate the relationship between Broad Reading Ability at Year 1 and teacher-reported Peer Problems at Year 4.

To test the hypothesis whether Year 1 executive functioning scores moderate the relationship between Year 1 Broad Reading scores and Year 4 teacher-reported peer problems, a hierarchical multiple regression analysis was conducted. In the first step, two variables were included: Year 1 Broad Reading scores and Year 1 executive function scores. Table 8 shows the moderation regression coefficients. These variables did not account for a significant amount of variance in teacher-reported peer problems (R^2= .001, F (2, 372) = .001, p< .85). Next, the interaction term between Broad Reading and executive functioning was added to the regression model. Like the previous regression model, it did not account for a significant amount of variance in teacher-reported peer problems in Year 4 (R^2= .002, F (1, 371) = .40, p< .53).

To test the whether Year 1 executive functioning scores mediated the relationship between Year 1 Broad Reading scores and Year 4 teacher-reported peer problems, regression methods were also used using the Process software in SPSS (Hayes, 2011). Table 9 shows the regression coefficients for the mediation analysis. In Step 1 of the mediation model, the regression of the Year 1 Broad Reading scores on Year 4 teacher-reported peer problems, ignoring the mediator, was not significant (B = .01, t (373) =

.46, p = .65). Step 2 showed that the regression of the Broad Reading scores on the mediator, executive function scores, was not significant (B = .001, t (373) = 1.08, p = .28). Step 3 of the mediation process showed that the mediator (executive function), controlling for Broad Reading scores, was not significant (B = .05, t (372) = .33, p = .74).

Table 8 Moderation Analysis for Teacher-Reported Peer Problems

	Teacher-Reported Peer Problems T4			
Variable	*B*	SE_B	t	*p*
Step 1				
Constant	3.40	1.27	2.67	.008
EF	.05	.16	.33	.74
Reading	.001	.001	.44	.66
Step 2				
Constant	6.98	5.80	1.20	.23
EF	-.44	.79	-.56	.58
Reading	-.01	.01	-.58	.56
EF*Reading	.001	.002	.63	.53

Note. EF=Executive Functioning Year 1; Reading= Broad Reading score Year 1; EF* Reading= Executive Functioning and Broad Reading Interaction;

Table 9 Mediation Regression Analysis for Teacher-Reported Peer Problems

	Peer Problems Y4			
Variable	*B*	SE_B	t	*p*
Step 1				
Constant	3.77	.59	6.37	.001
Reading	.001	.001	.46	.65
Step 2				
Constant	7.27	.20	36.66	.001
Reading*	.001	.001	1.08	.28
Step 3				
Constant	3.40	1.27	2.67	.008
EF	.05	.15	.33	.74
Reading	.001	.001	.44	.66

Note. EF=Executive Functioning; Reading= Broad Reading scores Y1; Reading*= Reading scores with dependent variable being Executive Function

Research Question 6

Are Conduct Problems at Year 4, as measured by the teacher SDQ, predictive of self-reported antisocial behavior, teacher-reported disciplinary actions, and conduct problems at Year 9? It was hypothesized that Conduct Problems at Year 4, as measured by the teacher SDQ, will not be predictive of antisocial involvement, but will be predictive of teacher-reported disciplinary actions and social problems at Year 9.

In order to determine if Year 4 teacher-reported conduct problems predicted Year 9 teacher-reported disciplinary actions, teacher-reported conduct problems, and self-reported antisocial behavior, MANOVA was conducted. As shown in Table 10, there was a statistically significant difference in behavior difficulties based on the Year 4 teacher-reported conduct problems (F (36, 642) = 1.88, p=.002; Wilks' Λ=.74; partial η^2 = .09). Year 4 teacher-reported conduct problems had a statistically significant effect on Year 9 teacher-reported conduct problems (F (12, 219) = 3.99, p<.001; partial η^2 = .18), teacher-reported disciplinary actions (F (12, 219) = 2.08, p=.02; partial η^2 = .10), and self-reported antisocial behavior (F (12, 219) = 1.86, p=.04; partial η^2 = .09).

Research Question 7

Are Peer Problems at Year 4, as measured by the teacher SDQ, predictive of self-reported antisocial behavior, teacher-reported disciplinary actions, and peer problems at Year 9? It was hypothesized that Peer Problems at Year 4, as measured by the teacher-reported SDQ, would not be predictive of antisocial involvement, but will be predictive of teacher-reported disciplinary actions and social problems at Year 9.

In order to determine if Year 4 teacher-reported peer problems were predicted Year 9 teacher-reported disciplinary actions, teacher-reported peer problems, and self-reported antisocial behavior, MANOVA was conducted. As shown in Table 11, there was not a statistically significant difference in behavior difficulties based on the Year 4 teacher-reported peer problems (F (33,569) = 1.29, p=.13; Wilks' Λ=.81; partial η^2 = .07).

Table 10 Multivariate Analysis of Variance Summary: Teacher-Reported Conduct Problems

Source	df	F	partial η^2	Type III Sum Of Squares	*p*
Antisocial	12	1.86	.09	17.57	.04
Discipline	12	2.08	.10	3.58	.02
T CP T9	12	3.99	.18	117.45	<.001

Note: T CP T4= Teacher-reported conduct-problems T4; Antisocial= self-reported antisocial behaviors at T9; T CP T9= Teacher-reported conduct-problems T9; Discipline T9= Teacher-reported discipline T9

Table 11 Multivariate Analysis of Variance Summary: Teacher-Reported Peer Problems

Source	df	F	partial η^2	Type III Sum Of Squares	*p*
Antisocial	11	.71	.04	6.20	.73
Discipline	11	1.26	.07	1.80	.25
T PP T9	11	1.69	.09	42.66	.08

Note: T PP T4= Teacher-reported peer-problems T4; Antisocial= self-reported antisocial behaviors at T9; T PP T9= Teacher-reported peer-problems T9; Discipline T9= Teacher-reported discipline T9

CHAPTER V

SUMMARY

The school environment is home to a variety of behaviors, both positive and negative, displayed by its students. The present research examined the longitudinal effects of executive functioning and broad reading ability on externalizing behaviors in a sample of at-risk youth. Teacher-reported conduct problems at Time 4 were predictive of later discipline infractions and social problems of student at Time 9; however, teacher-reported peer problems were not predictive of these same outcomes.

No significant differences were present among different ethnicities or genders when comparing these groups to Broad Reading abilities, Executive Functioning scores, and teacher-reported conduct and peer problems. This is inconsistent with previous literature. One explanation for this finding is the homogeneity of the sample used in the present study. A criterion for participation in the present study was participation had to be below the 25^{th} percentile on the Broad Reading measure. Furthermore, the attrition rates for this sample revealed more males dropped out of the study between Time 1 and Time 9, which could have impacted the significance of results for gender.

Research regarding verbal ability and externalizing behavior problems has been mixed; some research has proposed an association between language development and later externalizing behavior (Petersen et al., 2013; Rodriguez et al., 1989). While other research has not found an association between language impairment and behavioral difficulties later in life (Manninen et al., 2013; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006). The current study found a small positive correlation between Broad

Reading ability at Time 1 and teacher-reported conduct and peer problems at Time 4. This suggests as a student's Broad Reading ability increased, so did their risk for teacher-reported conduct and peer problems at Time 4. As previously mentioned, the variability among the findings across both the current study and previous studies is likely due to the way language ability was measured. In the current study, Broad Reading ability was used to measure language ability in students, while previous studies have utilized pragmatic language skills as a measure of language ability (Petersen et al., 2013).

Petersen and colleagues (2015) stated executive function may have a mediating effect on language development and later externalizing behavior, particularly inattentive-hyperactivity. It was hypothesized executive function would mediate the relationship between Time 1 Broad Reading ability and Time 4 teacher-reported conduct and peer problems. It was determined executive functioning did not have a mediating nor moderating effect on this sample.

Implications of Findings

The current result yielded important implications for understanding the impact of social problems and development at critical times during a child's life. Children are impacted by the perceptions their teachers hold of them (Rosenthal & Jacobsen, 1966). Screening for social-emotional success or difficulties based on teacher's rating of the child's behavior could allow for early intervention programming to begin for the student. This, in turn, could lead to a decline in behavior difficulties in the classroom and community during their adolescent years. Additionally, screening for executive function

and language in early elementary school could help identify students at-risk for academic problems in later elementary school. School professionals allowed to intervene earlier in a child's life are allowed to teacher and monitor concepts throughout elementary and middle school to ensure academic and social-emotional success for the student.

For those already identified and entered into the juvenile justice system, these results show the importance of intervening at the social level for the individual. As children age, they become more influenced by their peer group than their family members. Helping an adolescent building skills to help decrease peer problems and conduct problems should be a focus of intervention techniques for this age group.

Limitations

While the current study had a large enough sample size and statistical power, some measures did not met assumptions of normality. Teacher-reported conduct problems and peer problems at Time 1, along with Time 1 Broad Reading scores did not met assumptions of normality. This is likely due to the homogeneous sample that was used for this study. All students who were recruited for participation in the larger study, were below the 25^{th} percentile on measures of academic achievement. Because of this criterion, the overall sample is homogenous across the variables. The variables in the current data set are also dependent on one another, as suggested by the results of the normality statistics. A more heterogeneous sample, which includes children with behavioral difficulties should be considered for future research.

Additionally, as mentioned above, Broad Reading scores were used at Time 1 as a measure of language ability for students. Future studies should use more exact means of measuring language, like pragmatic language skills, in future research. Teacher reports were the main method of data collection used for examining longitudinal behavioral difficulties. Self-report behavioral data was not available for use to examine the impact of behavioral difficulties on long-term social behavior. It is important to understand the difference between teacher-reported behavioral difficulties and self-reported behavioral difficulties. Future studies should investigate the effects of both teacher-reported and self-reported behavior ratings and their impact on long-term social behavior outcomes.

The SOCIAL Model was as the theoretical underpinning for this study; however, the model was not examined in its entirety across all time points. The current study utilized archival data; therefore, researchers did not have access to measurements of student's brain development or internal/external forces that could impact the overall functioning of the student. Additionally, broad measures of executive function and language ability were only used in Time 1. In order to better examine the SOCIAL Model, future research should examine executive functioning, language ability, and social-emotional functioning and its impact on social skills.

Conclusion

Prior research has examined the effects of executive functioning on behavior and verbal ability on behavior. The present study attempted to combine these variables, using the SOCIAL Model, to determine its effects on externalizing behaviors across time. It

was found that teacher-reported conduct problems at Time 4 were predictive of later discipline infractions and social problems of student at Time 9; however, teacher-reported peer problems were not predictive of these same outcomes. Executive functioning at Time 1 did not mediate, nor moderate the relationship between Broad Reading ability at Time 1 and teacher-reported conduct problems or peer problems at Time 4. Continued research using more specific measures of language ability, executive functioning, as well as the other model models, will be important in understanding the SOCIAL Model and its impact on developing social skills in youth.

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